Issued April 18, 1908.

U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN 321.

# THE USE OF THE SPLIT-LOG DRAG ON EARTH ROADS.

BY

D. WARD KING.


WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1908.

# LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF PUBLIC ROADS.
*Washington, D. C., March 17, 1908.*

SIR: I have the honor to transmit herewith a manuscript by Mr. D. Ward King, an expert in this Office on the split-log drag, which gives directions for the construction of the split-log drag and its use on earth roads. It contains information which will be of practical value to a large number of readers, and I therefore respectfully recommend that it be published as a Farmers' Bulletin.

Respectfully,

LOGAN WALLER PAGE,
*Director.*

Hon. JAMES WILSON,
*Secretary of Agriculture.*

# CONTENTS.



# ILLUSTRATIONS.

# THE USE OF THE SPLIT-LOG DRAG ON EARTH ROADS.

## INTRODUCTION.

The earth road is by far the most common type of highway in this country. Its cheapness in comparison with other types of construction and the absence in many sections of the country of rock, gravel, or other hard natural materials for road building will render its use necessary for many years to come.

There are at present in this country about 2,000,000 miles of such roads, most of which must be maintained by some means more or less inexpensive. The split-log drag is of great service on roads of this class, and an increasing mileage of the rural highways of this country is being kept in repair economically and well by the use of this simple implement. It is now in use in many States of the Union and in foreign countries also, and its adoption in most localities where there are earth roads will doubtless increase.

The aim in writing this bulletin has been to give a concise description of the construction of the split-log drag and the method of using it which will give the best results. The ditch cleaner, another useful implement for use on earth roads, has also been briefly described.

## THE CONSTRUCTION OF A SPLIT-LOG DRAG.

The author has experimented with a great variety of devices for road dragging, but has found the two-slab log or plank drag with liberal "set back" the most satisfactory. Double drags for working both sides of the roadway simultaneously have been tried with only limited success. The reason for this lies in the fact that both sides of an earth road are never exactly alike. This causes the two parts of the drag to work unevenly and to interfere with each other. It is also impossible for one man to operate both parts successfully, as will be shown later on.

Two mistakes are commonly made in constructing a drag. The first lies in making it too heavy. It should be so light that one man can easily lift it. Besides, a light drag responds more readily to various methods of hitching and to the shifting of the position and weight of the operator, both of which are essential considerations and are discussed more fully under the head "How to use a drag" (p. 9). A drag can be made heavier at any time by proper weighting.

The other mistake is in the use of squared timbers, instead of those with sharp edges, whereby the cutting effect of sharp edges is lost and

the drag is permitted to glide over instead of to equalize the irregularities in the surface of the road. These mistakes are due partly to badly drawn illustrations and plans of drags which have occasionally appeared in newspapers and partly to the erroneous idea that it is necessary that a large amount of earth shall be moved at one time.

A dry red cedar log is the best material for a drag. Red elm and walnut when thoroughly dried are excellent, and box elder, soft maple, or even willow are preferable to oak, hickory, or ash.

The log should be 7 or 8 feet long and from 10 to 12 inches in diameter, and carefully split down the middle. The heaviest and best slab should be selected for the front. At a point on this front slab 4 inches from the end that is to be at the middle of the road locate the

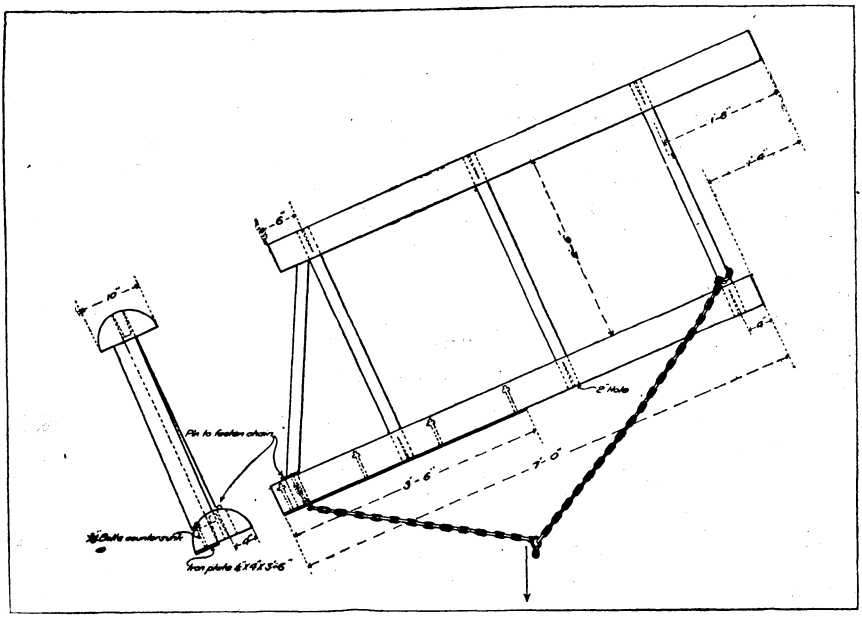

FIG. 1.—Plan and elevation of split-log drag.

center of the hole to receive a cross stake and 22 inches from the other end of the front slab locate the center for another cross stake. The hole for the middle stake will lie on a line connecting and halfway between the other two. See figure 1. The back slab should now be placed in position behind the other. From the end which is to be at the middle of the road measure 20 inches for the center of the cross stake, and 6 inches from the other end locate the center of the outside stake. Find the center of the middle hole as before. When these holes are brought opposite each other, one end of the back slab will lie 16 inches nearer the center of the roadway than the front one, giving what is known as "set back." The holes should be 2 inches in diameter. Care must be taken to hold the auger plumb in boring

these holes in order that the stakes shall fit properly. The hole to receive the forward end of the chain should be bored at the same time.

The two slabs should be held 30 inches apart by the stakes. Straight-grained timber should be selected for the stakes, so that each stake shall fit snugly into the 2-inch hole when the two slabs are in the proper position. The stakes should taper gradually toward the ends. There should be no shoulder at the point where the stakes enter the slab. The stakes should be fastened in place by wedges only.

When the stakes have been placed in position and tightly wedged, a brace 2 inches thick and 4 inches wide should be placed diagonally to them at the ditch end, as shown in figure 1. The brace should be dropped on the front slab, so that its lower edge shall lie within an inch of the ground, while the other end should rest in the angle between the slab and the end stake.

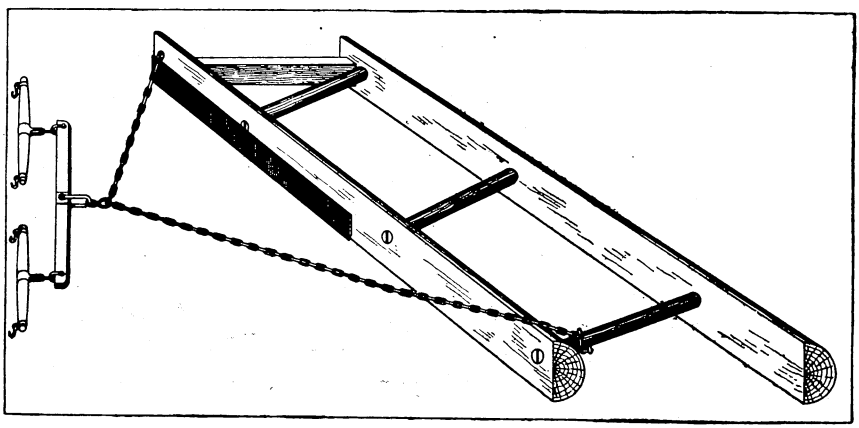

FIG. 2.—Perspective view of split-log drag.

A strip of iron about 3½ feet long, 3 or 4 inches wide and ¼ of an inch thick may be used for the blade. This should be attached to the front slab, so that it will be one-half inch below the lower edge of the slab at the ditch end, while the end of the iron toward the middle of the road should be flush with the edge of the slab. The bolts holding the blade in place should have flat heads and the holes to receive them should be countersunk.

If the face of the log stands plumb it is well to wedge out the lower edge of the blade with a three-cornered strip of wood to give it a set like the bit of a plane.

A platform of inch boards held together by three cleats should be placed on the stakes between the slabs. These boards should be spaced at least an inch apart to allow any earth that may heap up and fall over the front slab to sift through upon the road again. The end cleats should be placed so that they will not rest upon the

cross stakes, but drop inside them, while the middle cleat can be shifted to either side of the middle stake. These cleats should extend about an inch beyond the finished width of the platform.

An ordinary trace chain is strong enough to draw the implement, provided the clevis is not fastened through a link. The chain should be wrapped around the rear stake, then passed over the front slab. Raising the chain at this end of the slab allows the earth to drift past the face of the drag. The other end of the chain should be passed through the hole in the end of the slab and is held by a pin passed through a link. One and one-half trace chains are sufficient.

In many logs the grain runs around the tree in such a way that when split the slabs will be in a "wind." If this wind is not more

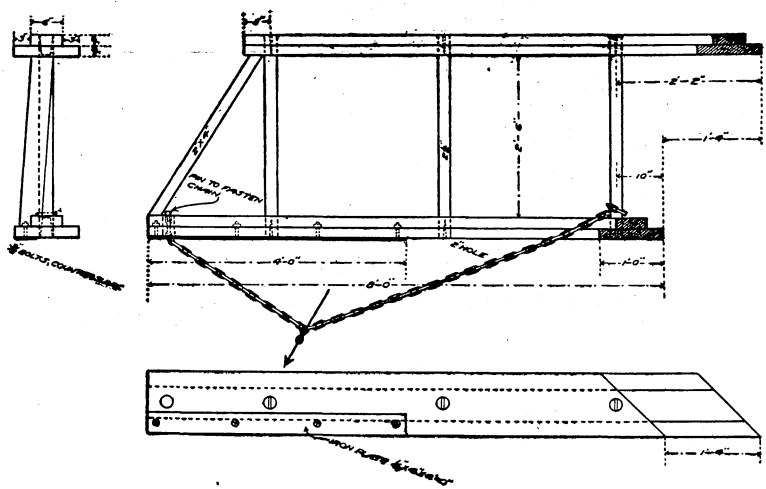

FIG. 3.—Plan, front and side views of plank drag.

than 4 inches in 8 feet, the timber can be used to good advantage by setting it so that the blade end of the log shall slant forward when the other end is perpendicular. The construction of the drag in this case is the same as given above, but care must be taken that the holes bored to receive the stakes are plumb. No wedging under the lower edge of the blade is necessary in using such a log.

Drags are often constructed of planks instead of logs. There is nothing in the construction of a plank drag that calls for particular mention except the strengthening of the planks along their middle line by a 2 by 6 inch strip, as is shown in figure 3. A triangular strip may be used under the lower edge of the blade to give it the proper cutting slope.

## HOW TO USE A DRAG.

The successful operation of a drag involves two principles, which when thoroughly understood and intelligently applied, make road working with this implement very simple. The first concerns the length and position of the hitch, while the second deals with the position of the driver on the drag. Each influences the other to a large extent, and successful manipulation of the drag is dependent upon an understanding of both of them.

For ordinary purposes the snatch link or clevis should be fastened far enough toward the blade end of the chain to force the

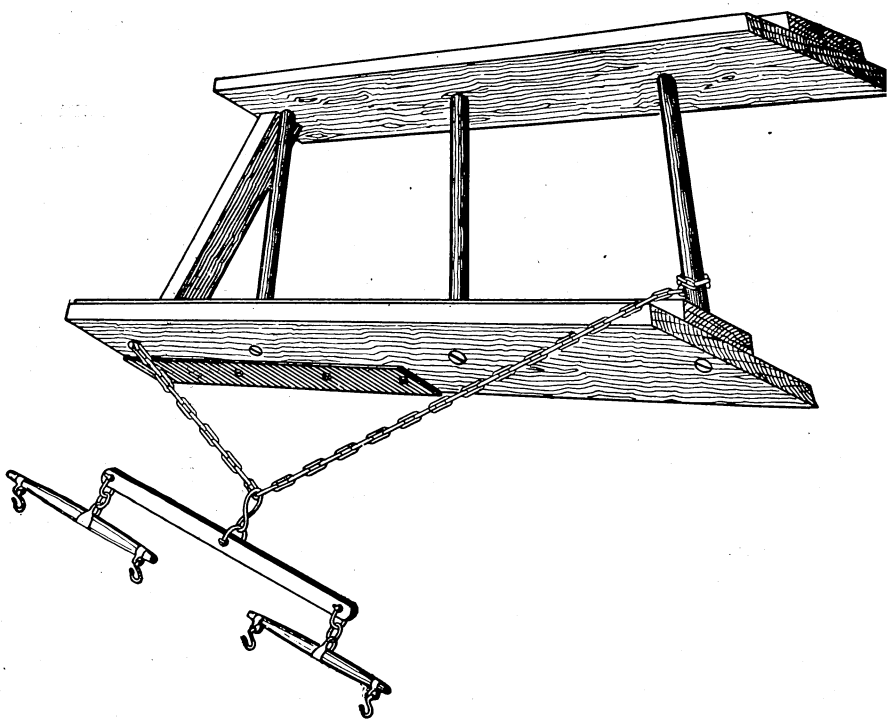

Fig. 4.—Perspective view of plank drag.

unloaded drag to follow the team at an angle of 45 degrees. This will cause the earth to move along the face of the drag smoothly and will give comparatively light draft to the team, provided the driver rides in the line of draft. Sometimes, however, conditions are met which require special treatment, and in a rolling country such conditions are not infrequent. Often a flat place several rods in length or a seepy spot needs special attention.

The distance from the drag at which the team is hitched affects the depth of the cutting. Shortening the chain tends to lift the

front slab from the ground; a longer hitch causes the blade to cut more deeply. The length of hitch may be regulated by lengthening and shortening the chain at the end which runs through the hole in the blade end of the drag.

If small weeds are to be cut or a furrow of earth is to be moved, the doubletree should be attached rather close to the ditch end of the drag. The drag will now move nearly ditch end foremost, and the driver should stand with one foot on the extreme forward end of the front slab. This will swing the drag back to the proper angle and will cause the blade to plow. This hitch requires slow and careful driving in order to prevent the drag from tipping forward. If the blade should plow too deeply, as it may do in a wet spot, the driver should shift his weight toward the back slab.

If straw and weeds clog the blade, they can usually be removed if the driver shifts his weight to a point as far as possible from the ditch or blade end. Similarly, if he steps quickly away from the ditch end, the load of earth may be dropped into a low place or mudhole.

Some attention should be given to the edge of the blade. In the beginning, the average earth road requires no steel plate on the drag, though the drag will be better preserved if the steel is applied at first. At the end of a year's work, if the dragging has been faithfully done, a steel plate will be needed. If the twist of the log is properly used, or the three-cornered strip of wood is placed under the blade as described on page 7, a flat piece of steel will answer. In case the blade stands perpendicularly it should be slightly cupped when sharpened.

Usually two horses are enough to pull a drag over an ordinary earth road. When four horses are used, they should be hitched to the drag by means of a four-horse evener. The team should be driven with one horse on either side of the right-hand wheel track or rut the full length of the portion to be dragged, and the return made over the other half of the roadway.

The object of such treatment is to move earth toward the center of the roadway and to raise it gradually above the surrounding level. While this is being accomplished, all mudholes and ruts will be filled, into which traffic will pack the fresh earth.

## WHEN TO USE A DRAG.

The drag does the best work when the soil is moist, but not sticky. The earth then moves freely along the faces of the slabs. If the roadway is very badly rutted and full of holes, it may be well to use the drag once when the ground is slushy. This treatment is particularly applicable before a cold spell in winter when it is possible to have a roadway freeze smooth.

A smooth road surface is secured by this method. Clay, when mixed with water and thoroughly worked, becomes remarkably tough and impervious to water. If compacted in this condition it becomes extremely hard.

Another valuable result of dragging is the reduction of dust, for the particles of clay cohere so tenaciously that there is but little wear when the surface is smooth. Dust on an earth road is due to the breaking up under traffic of the frayed and upturned edges of ruts and hoof prints. If the surface is smoothed after each rain and the road dries hard and even, no edges are exposed to crushing and the only dust which forms is that due to actual wear of the road surface.

There are so many influences at work and conditions are so varied in different localities that it is quite impossible to lay down a general rule for the number of treatments needed to keep a road in good condition. A tough clay or a stiff sandy clay will resist the action of wheels and hoofs for a longer period than a loam, other things being equal. Certain sections of a roadway will require more attention than others because of steep grades, seepage, exposure to hillside wash, etc. The best guide in meeting these conditions is the knowledge and experience gained while dragging the roadway.

There is one condition, however, in which special treatment should be given to a road. Clay hills under persistent dragging frequently become too high in the center. To correct this it is best to drag the earth toward the center of the road twice and away from it once.

## USE OF A DRAG ON ROCKY OR GRAVELLY ROADS.

In soils full of loose stones or even small bowlders the drag has done good service. The loose stones are drawn into a windrow down the center of the road while the earth is deposited around the bowlders in such a way that the surface is leveled. The loose stones in the center of the road should of course be removed. Where there is a large proportion of small stones or gravel the drag will keep down the inequalities in the surface.

## COST DATA.

There is little available data on the cost of maintenance of earth roads by dragging. However, there is no doubt as to the economy of the drag, either in first cost or in its operation. The most elaborate form will cost but a few dollars for material and labor, while one man and team can operate it successfully under all usual conditions. As a consequence, the statements given below are well within reason and indicate what may be accomplished with a very small outlay.

The following figures show the cost of maintaining ordinary country roads per mile per year without a drag, and may be taken as a basis

of the cost of such maintenance. They were obtained in Kansas by Prof. W. C. Hoad, of the University of Kansas, in 1906, and were taken from the official records of the counties:

| | |
|---|---|
| Crawford County | $52 |
| Douglas County | 38 |
| Franklin County | 34 |
| Johnson County | 48 |
| Neosho County | 40 |
| Saline County | 43 |

The average cost is $42.50 per mile per year, and it may safely be said that the cost of dragging would be trifling in comparison.

Mr. F. P. Sanborn[a] states: "The least expense per mile [for dragging] was about $1.50; the greatest a little over $6; the average expense per mile for 5½ miles a little less than $3." Commenting further, Mr. Sanborn declares: "The writer has lived by this piece of road all his life, and although we have had the extremes of weather this season, both wet and dry, not for forty years has the road in question been so free from mud and dust. Parties who have known the road all their lives are agreed that it never was in so good condition a season through."

When Mr. R. H. Aishton, general manager of the Chicago and Northwestern Railroad, investigated the work of the split-log drag at Sac City, Iowa, preliminary to the campaign inaugurated by that company in 1905, he learned that one township had experimented with the drag on 28 miles of highway, for a year. He found that the township paid for the making of the drags and hired men to use them, including the original cost of the drags when figuring the expense of the year's work. The total expense for the twelve months averaged $2.40 per mile, and the roads were reported to have been "like a race track" the larger portion of the year.

A neighborhood of farmers in Ray County, Mo., employed one of their number to drag a 5-mile stretch. He received compensation at the rate of $3 per day. When the end of the year came and a settlement was made, the cost for the year was found to be $1.66 per mile. The road is a tough clay and my informant declares it was always much better than the other roads in the neighborhood.

Prof. William Robertson, of the Minnesota Agricultural Station, after a year's experience in dragging a "main road made entirely of gumbo without any sand or gravel, and which during the past year has shown no defects either by rutting or development of soft places," fixes the cost of the work at not to exceed $5 per mile.

---

[a] Report of Highway Commissioner of Maine, 1906, p. 112.

## CONSTRUCTION AND USE OF A DITCH CLEANER.

The ditcher or ditch cleaner is a convenient device for clearing ditches. It consists of a guide plank, 2 inches by 12 inches by 12 feet, and a mold board, 2 inches by 12 inches by 8 feet. These are braced with a crosspiece 3 feet long as shown in figure 5. The mold board should be shod with an iron plate ¼ inch by 4 inches by 3 feet, held in position with ⅜-inch bolts countersunk. The cross brace should be hollowed 3 inches on each side at the middle, the hollowing to begin not less than 4 inches from each end, in order that its bearing against the guide and mold board planks shall not be shortened, nor the nailing space decreased. This is done to prevent earth from heaping up in front of the brace. A light platform is needed to make the use of the ditcher safe.

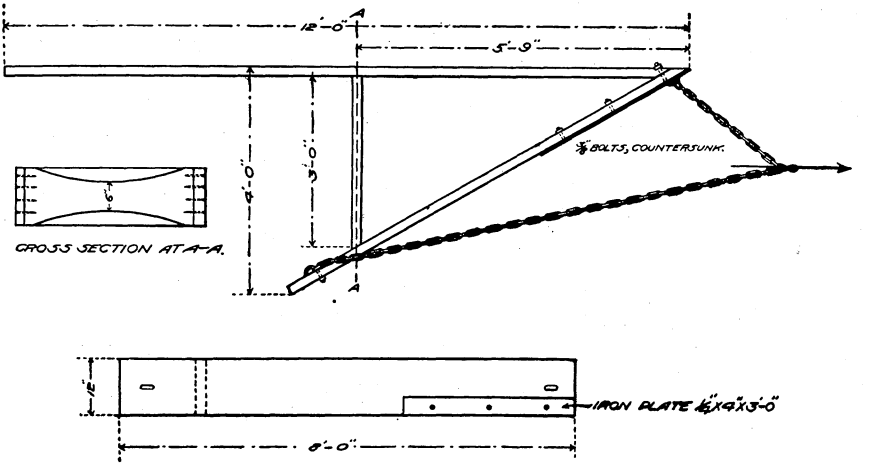


FIG. 5.—Plan of plank ditch cleaner.

The hitch is made as shown in figure 5, the short side of the chain being about 2 feet 3 inches in length and the long side 8 feet 3 inches. The chain is made to pass over the mold board, so that it may clear itself more readily. Two or three horses, according to the difficulty of the particular condition, are necessary to clear a ditch.

To secure the best service from the ditcher, a weight of about 200 pounds should be placed over the front end. The essential thing to be gained is to have the ditcher maintain a smooth, even surface on the bottom of the ditch. There is then no obstruction to the flow of water. This requires that soft, muddy holes be passed over lightly and hard, high places be reduced. This result is obtained if the driver shifts his weight forward or backward as a high point or a mudhole is approached. If the driver shifts his weight forward, the point of the ditcher is driven into the ground. If he moves back, the pres-

sure on the forward end is relieved and the pull on the chain tends to raise it.

Besides clearing the ditch, the ditcher assists in preserving the slope from the side of the road to the bottom of the ditch. This keeps the road safe from possible accident to traffic from ditches with too abrupt slopes.

## CONCLUSION.

The advantages to be gained from the persistent use of a road drag may be summarized as follows:

1. The maintenance of a smooth, serviceable earth road free from ruts and mudholes.

2. Obtaining such a road surface with the expenditure of very little money and labor in comparison with the money and labor required for other methods.

3. The reduction of mud in wet weather, and of dust in dry weather.

There are also several minor benefits gained from the use of a road drag, besides the great advantages which always accrue from the formation of improved highways, of which may be mentioned the banishment of weeds and grass from the dragged portion of the road.

## FARMERS' BULLETINS.

The following is a list, by number, of the Farmers' Bulletins available for distribution. The bulletins entitled "Experiment Station Work" give in brief the results of experiments performed by the State experiment stations. Titles of other bulletins are self-explanatory. Bulletins in this list will be sent free to any address in the United States on application to a Senator, Representative, or Delegate in Congress, or to the Secretary of Agriculture, Washington, D. C. Numbers omitted have been discontinued, being superseded by later bulletins.

22. The Feeding of Farm Animals. Pp. 40.
24. Hog Cholera and Swine Plague. Pp. 16.
27. Flax for Seed and Fiber. Pp. 16.
28. Weeds: And How to Kill Them. Pp. 30.
29. Souring and Other Changes in Milk. Pp. 22.
30. Grape Diseases on the Pacific Coast. Pp. 15.
32. Silos and Silage. Pp. 30.
33. Peach Growing for Market. Pp. 24.
34. Meats: Composition and Cooking. Pp. 31.
35. Potato Culture. Pp. 24.
36. Cotton Seed and Its Products. Pp. 16.
42. Facts about Milk. Pp. 32.
44. Commercial Fertilizers. Pp. 38.
47. Insects Affecting the Cotton Plant. Pp. 32.
48. The Manuring of Cotton. Pp. 16.
51. Standard Varieties of Chickens. Pp. 48.
52. The Sugar Beet. Pp. 48.
54. Some Common Birds. Pp. 48.
55. The Dairy Herd. Pp. 30.
56. Experiment Station Work—I. Pp. 30.
58. The Soy Bean as a Forage Crop. Pp. 24.
59. Bee Keeping. Pp. 48.
60. Methods of Curing Tobacco. Pp. 24.
61. Asparagus Culture. Pp. 40.
62. Marketing Farm Produce. Pp. 31.
63. Care of Milk on the Farm. Pp. 40.
64. Ducks and Geese. Pp. 55.
65. Experiment Station Work—II. Pp. 32.
66. Meadows and Pastures. Pp. 30.
69. Experiment Station Work—III. Pp. 32.
71. Essentials in Beef Production. Pp. 24.
72. Cattle Ranges of the Southwest. Pp. 32.
73. Experiment Station Work—IV. Pp. 32.
74. Milk as Food. Pp. 39.
77. The Liming of Soils. Pp. 24.
78. Experiment Station Work—V. Pp. 32.
79. Experiment Station Work—VI. Pp. 27.
80. The Peach Twig-Borer. Pp. 16.
81. Corn Culture in the South. Pp. 24.
82. The Culture of Tobacco. Pp. 22.
83. Tobacco Soils. Pp. 23.
84. Experiment Station Work—VII. Pp. 32.
85. Fish as Food. Pp. 32.
86. Thirty Poisonous Plants. Pp. 32.
87. Experiment Station Work—VIII. Pp. 32.
88. Alkali Lands. Pp. 23.
91. Potato Diseases and Treatment. Pp. 15.
92. Experiment Station Work—IX. Pp. 30.
93. Sugar as Food. Pp. 31.
95. Good Roads for Farmers. Pp. 46.
97. Experiment Station Work—X. Pp. 32.
98. Suggestions to Southern Farmers. Pp. 48.
99. Insect Enemies of Shade Trees. Pp. 30.
100. Hog Raising in the South. Pp. 40.
101. Millets. Pp. 30.
102. Southern Forage Plants. Pp. 48.
103. Experiment Station Work—XI. Pp. 30.
104. Notes on Frost. Pp. 24.
105. Experiment Station Work—XII. Pp. 32.
106. Breeds of Dairy Cattle. Pp. 48.
107. Experiment Station Work—XIII. Pp. 32.
108. Saltbushes. Pp. 20.
110. Rice Culture in the United States. Pp. 28.
111. Farmers' Interest in Good Seed. Pp. 24.
112. Bread and Bread Making. Pp. 40.
113. The Apple and How to Grow It. Pp. 32.
114. Experiment Station Work—XIV. Pp. 28.
116. Irrigation in Fruit Growing. Pp. 48.
118. Grape Growing in the South. Pp. 32.
119. Experiment Station Work—XV. Pp. 30.
120. Insects Affecting Tobacco. Pp. 32.
121. Beans, Peas, and Other Legumes as Food. Pp. 38.
122. Experiment Station Work—XVI. Pp. 32.
124. Experiment Station Work—XVII. Pp. 32.
125. Protection of Food Products from Injurious Temperatures. Pp. 24.
126. Practical Suggestions for Farm Buildings. Pp. 48.
127. Important Insecticides. Pp. 46.
128. Eggs and Their Uses as Food. Pp. 40.
129. Sweet Potatoes. Pp. 40.
131. Household Tests for Detection of Oleomargarine and Renovated Butter. Pp. 10.
132. Insect Enemies of Growing Wheat. Pp. 38.
133. Experiment Station Work—XVIII. Pp. 32.
134. Tree Planting in Rural School Grounds. Pp. 32.
135. Sorghum Sirup Manufacture. Pp. 40.
137. The Angora Goat. Pp. 48.
138. Irrigation in Field and Garden. Pp. 40.
139. Emmer: A Grain for the Semiarid Regions. Pp. 16.
140. Pineapple Growing. Pp. 48.
142. Principles of Nutrition and Nutritive Value of Food. Pp. 48.
144. Experiment Station Work—XIX. Pp. 32.
145. Carbon Bisulphid as an Insecticide. Pp. 28.
147. Winter Forage Crops for the South. Pp. 40.
149. Experiment Station Work—XX. Pp. 32.
150. Clearing New Land. Pp. 24.
151. Dairying in the South. Pp. 48.
152. Scabies in Cattle. Pp. 32.
153. Orchard Enemies in the Pacific Northwest. Pp. 39.
154. The Home Fruit Garden: Preparation and Care. Pp. 16.
155. How Insects Affect Health in Rural Districts. Pp. 19.
156. The Home Vineyard. Pp. 22.
157. The Propagation of Plants. Pp. 24.
158. How to Build Small Irrigation Ditches. Pp. 28.
159. Scab in Sheep. Pp. 48.
161. Practical Suggestions for Fruit Growers. Pp. 30.
162. Experiment Station Work—XXI. Pp. 32.
164. Rape as a Forage Crop. Pp. 16.
165. Silkworm Culture. Pp. 32.
166. Cheese Making on the Farm. Pp. 16.
167. Cassava. Pp. 32.
168. Pearl Millet. Pp. 16.
169. Experiment Station Work—XXII. Pp. 32.
170. Principles of Horse Feeding. Pp. 44.
172. Scale Insects and Mites on Citrus Trees. Pp. 43.
173. Primer of Forestry. Pp. 48.
174. Broom Corn. Pp. 30.
175. Home Manufacture and Use of Unfermented Grape Juice. Pp. 16.
176. Cranberry Culture. Pp. 20.
177. Squab Raising. Pp. 32.
178. Insects Injurious in Cranberry Culture. Pp. 32.
179. Horseshoeing. Pp. 30.
181. Pruning. Pp. 39.
182. Poultry as Food. Pp. 40.
183. Meat on the Farm: Butchering, Curing, and Keeping. Pp. 37.
185. Beautifying the Home Grounds. Pp. 24.
186. Experiment Station Work—XXIII. Pp. 32.
187. Drainage of Farm Lands. Pp. 38.
188. Weeds Used in Medicine. Pp. 45.
190. Experiment Station Work—XXIV. Pp. 32.
192. Barnyard Manure. Pp. 32.
193. Experiment Station Work—XXV. Pp. 32.

194. Alfalfa Seed. Pp. 14.
195. Annual Flowering Plants. Pp. 48.
196. Usefulness of the American Toad. Pp. 16.
197. Importation of Game Birds and Eggs for Propagation. Pp. 30.
198. Strawberries. Pp. 24.
199. Corn Growing. Pp. 32.
200. Turkeys. Pp. 40.
201. Cream Separator on Western Farms. Pp. 23.
202. Experiment Station Work—XXVI. Pp. 32.
203. Canned Fruits, Preserves, and Jellies. Pp. 32.
204. The Cultivation of Mushrooms. Pp. 24.
206. Milk Fever and Its Treatment. Pp. 16.
208. Varieties of Fruits Recommended for Planting. Pp. 48.
209. Controlling the Boll Weevil in Cotton Seed and at Ginneries. Pp. 32.
210. Experiment Station Work—XXVII. Pp. 32.
211. The Use of Paris Green in Controlling the Cotton Boll Weevil. Pp. 23.
213. Raspberries. Pp. 38.
215. Alfalfa Growing. Pp. 40.
217. Essential Steps in Securing an Early Crop of Cotton. Pp. 16.
218. The School Garden. Pp. 40.
219. Lessons from the Grain Rust Epidemic of 1904. Pp. 24.
220. Tomatoes. Pp. 32.
221. Fungous Diseases of the Cranberry. Pp. 16.
222. Experiment Station Work—XXVIII. Pp. 32.
223. Miscellaneous Cotton Insects in Texas. Pp. 24.
224. Canadian Field Peas. Pp. 16.
225. Experiment Station Work—XXIX. Pp. 32.
226. Relation of Coyotes to Stock Raising in the West. Pp. 24.
227. Experiment Station Work—XXX. Pp. 32.
228. Forest Planting and Farm Management. Pp. 22.
229. The Production of Good Seed Corn. Pp. 24.
231. Spraying for Cucumber and Melon Diseases. Pp. 24.
232. Okra: Its Culture and Uses. Pp. 16.
233. Experiment Station Work—XXXI. Pp. 32.
234. The Guinea Fowl. Pp. 24.
235. Preparation of Cement Concrete. Pp. 32.
236. Incubation and Incubators. Pp. 32.
237. Experiment Station Work—XXXII. Pp. 32.
238. Citrus Fruit Growing in the Gulf States. Pp. 48.
239. The Corrosion of Fence Wire. Pp. 32.
241. Butter Making on the Farm. Pp. 32.
242. An Example of Model Farming. Pp. 16.
243. Fungicides and Their Use in Preventing Diseases of Fruits. Pp. 32.
244. Experiment Station Work—XXXIII. Pp. 32.
245. Renovation of Worn-Out Soils. Pp. 16.
246. Saccharine Sorghums for Forage. Pp. 37.
247. The Control of the Codling Moth and Apple Scab. Pp. 21.
248. The Lawn. Pp. 20.
249. Cereal Breakfast Foods. Pp. 36.
250. The Prevention of Wheat Smut and Loose Smut of Oats. Pp. 16.
251. Experiment Station Work—XXXIV. Pp. 32.
252. Maple Sugar and Sirup. Pp. 36.
253. The Germination of Seed Corn. Pp. 16.
254. Cucumbers. Pp. 30.
255. The Home Vegetable Garden. Pp. 47.
256. Preparation of Vegetables for the Table. Pp. 48.
257. Soil Fertility. Pp. 39.
258. Texas or Tick Fever and Its Prevention. Pp. 45.
259. Experiment Station Work—XXXV. Pp. 32.
260. Seed of Red Clover and Its Impurities. Pp. 24.
261. The Cattle Tick. Pp. 22.
262. Experiment Station Work—XXXVI. Pp. 32.
263. Practical Information for Beginners in Irrigation. Pp. 40.
264. The Brown-Tail Moth and How to Control It. Pp. 22.
266. Management of Soils to Conserve Moisture. Pp. 30.
267. Experiment Station Work—XXXVII. Pp. 32.
268. Industrial Alcohol: Sources and Manufacture. Pp. 45.
269. Industrial Alcohol: Uses and Statistics. Pp. 29.
270. Modern Conveniences for the Farm Home. Pp. 48.
271. Forage Crop Practices in Western Oregon and Western Washington. Pp. 39.
272. A Successful Hog and Seed-Corn Farm. Pp. 16.
273. Experiment Station Work—XXXVIII. Pp. 32.
274. Flax Culture. Pp. 36.
275. The Gipsy Moth and How to Control It. Pp. 22.
276. Experiment Station Work—XXXIX. Pp. 32.
277. The Use of Alcohol and Gasoline in Farm Engines. Pp. 40.
278. Leguminous Crops for Green Manuring. Pp. 27.
279. A Method of Eradicating Johnson Grass. Pp. 16.
280. A Profitable Tenant Dairy Farm. Pp. 16.
281. Experiment Station Work—XL. Pp. 32.
282. Celery. Pp. 36.
283. Spraying for Apple Diseases and the Codling Moth in the Ozarks. Pp. 42.
284. Insect and Fungous Enemies of the Grape East of the Rocky Mountains. Pp. 48.
285. The Advantage of Planting Heavy Cotton Seed. Pp. 16.
286. Comparative Value of Whole Cotton Seed and Cotton-Seed Meal in Fertilizing Cotton. Pp. 14.
287. Poultry Management. Pp. 48.
288. Nonsaccharine Sorghums. Pp. 28.
289. Beans. Pp. 28.
290. The Cotton Bollworm. Pp. 32.
291. Evaporation of Apples. Pp. 38.
292. Cost of Filling Silos. Pp. 15.
293. Use of Fruit as Food. Pp. 38.
294. Farm Practice in the Columbia Basin Uplands. Pp. 30.
295. Potatoes and Other Root Crops as Food. Pp. 45.
296. Experiment Station Work—XLI. Pp. 32.
297. Methods of Destroying Rats. Pp. 8.
298. The Food Value of Corn and Corn Products. Pp. 40.
299. Diversified Farming Under the Plantation System. Pp. 14.
300. Some Important Grasses and Forage Plants for the Gulf Coast Region. Pp. 15.
301. Home-Grown Tea. Pp. 16.
302. Sea Island Cotton: Its Culture, Improvement, and Diseases. Pp. 48.
303. Corn Harvesting Machinery. Pp. 32.
304. Growing and Curing Hops. Pp. 39.
305. Experiment Station Work—XLII. Pp. 32.
306. Dodder in Relation to Farm Seeds. Pp. 27.
307. Roselle: Its Culture and Uses. Pp. 16.
308. Game Laws for 1907. Pp. 52.
309. Experiment Station Work—XLIII. Pp. 32.
310. A Successful Alabama Diversification Farm. Pp. 24.
311. Sand-Clay and Burnt-Clay Roads. Pp. 20.
312. A Successful Southern Hay Farm. Pp. 15.
313. Harvesting and Storing Corn. Pp. 32.
314. A Method of Breeding Early Cotton to Escape Boll-Weevil Damage. Pp. 20.
315. Progress in Legume Inoculation. Pp. 20.
316. Experiment Station Work—XLIV. Pp. 32.
317. Experiment Station Work—XLV. Pp. 32.
318. Cowpeas. Pp. 26.
319. Demonstration Work in Cooperation with Southern Farmers. Pp. 23.
320. Experiment Station Work—XLVI. Pp. 32.